PROBE VERSUS INFRARED

Choosing a pyrometer? What is better; probe type or Infrared? The answer really depends on the application. Most tire engineers prefer the probe type for tires as the probe gets down to the cord. At the cord, the tire heat is un-affected by outside factors and the surface rubber insulates the heat for long enough for you to take readings. There is also an elastic stretching of the rubber near the cord that creates heat as well. The bottom line is that probe type pyrometers are best for specific applications such as tires.

On the other hand, Infrared pyrometers are versatile and can be used to check just about any kind of surface temperatures. You can find sources of heat which will affect the driver, locate dead engine cylinders, check track temperatures, brakes and just about anything. You can even use them on tires. However, this is a bit of a compromise. You will be getting a surface reading that will be 10-40 degrees cooler than temps taken with a probe type pyrometer. You will also get variances from the engine and brake heat. Further, the track temperature will cool off the surface very quickly. A tire with camber in it will ride on the inside edge when the car is rolling back to the pits. The area that is in contact with the track will cool down at a different rate than the rest of the tire. Your readings will not be as relative as compared to probe readings.

If you accept the limitations, the Infrared pyrometers will work for tires but will not be relative to probe readings nor will the delineation be as good. Using the right tool for the right job always produces better results. Just as the probe type is better for tires, the infrared type is better for most other surface temps. The probe type is designed to be submerged in rubber and does not work well for things like track temperatures. For rubber, probe type is best. For surface measurements, the infrared stands out.

Longacre® Racing Products

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TIRE TEMPS TELL A STORY

For optimum performance (and hopefully a trip to Victory Lane) you need to maximize tire grip.

To do so you will need to run the right camber and air pressure.

Purchase a good probe type tire pyrometer to check tire temps and you are half way to the front.

To get accurate tire temps, it will be necessary to check each tire before the car returns to the pits. You need to do the test quickly, after a full speed practice run before the heat has the opportunity to dissipate.

For speed, you might want to consider having one crew person quickly check for temperatures, while a second crew member records the results. Another option would be to purchase the Longacre Memory Pyrometer (part # 50690) and the unit will do both functions (reading temps and recording them) at the same time. You will want to read the temps in 3 places across the tire face: the outside, center and inside area. For best results always read the tires in the same order (RF, followed by the RR, LR, LF) and each of the 3 readings in the same order.

If the middle of the tread face is hotter than both shoulders, you will want to consider lowering the air pressure. You will want to think about increasing the pressure if the center reading is cooler than both shoulders.

If the inside area of the right front tire is cooler than the outside area, you should look at increasing negative camber. Conversely, you would want to decrease negative camber if the inside area of the tread face is hotter than the outside area.

If the inside area of the left front tire is running cooler than the outside area, you should look at decreasing the positive camber. Conversely, you would increase positive camber if the inside area of the tire is running hotter than the outside tread area.

When racing on a paved oval, the goal would be to make pressure and camber changes that would keep the variance in temps across the face of the tire within 10%.

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NOTES ON TEMPERATURE AVERAGING

- Averages have more meaning when Camber, Tire Pressure, Stagger, Toe in and basic set up are correct. #1 rule in racing is to have all four wheels pointed straight ahead in order to consistently win races.

- You can see slightly higher front averages (5 to 10 degrees or so) due to absorption of heat from the engine and brakes.

- Hot inboard edges of rear tires can indicate too much rear tire stagger which can slightly skew temperature averages.

- New tires give the best results when taking temperature averages. Maximum heat is generated with all areas on the tire in new condition. More detail will be shown as no edges are ground off or over used. Camber curves are shown with more clarity. A racer should take advantage of their investment in a set of new tires and take special note of these average temperature readings.

- If the driver were to slow down so as to not slide the front tires when a car had a tendency to push then the hotter rear average would indicate a push instead of the generally assumed loose condition. Since most drivers drive as hard as they can they usually slide the front tires when the car has a tendency to push causing the front tires to overheat. When this condition is present the driver usually comes in for adjustments during a practice session rather than abusing the tires lap after lap.

- If one end of the car is sliding or spinning extra heat will be generated by that end until the adhesion in those tires is used up. At this point of overheating the tires will probably never have the same grip that they had before they were over used and tire temperatures will drop due to the poor condition of the tires and less friction being produced. Care should be taken to know the driving style of your driver and condition of tires in order for the temperature averages to be a useful tool.

- Generally, temperature averages that are more equal LR/RF against RR/LF will show a car that will be better on a long run; however some short track racers may find some extra speed in a short race with 10 or so degrees difference with the LR/RF showing the extra heat. The tires in this situation are actually being overworked a small amount gaining you

the extra speed. Sometimes in a short event the tires will put up with the extra abuse resulting in faster lap times in the short distance. In a longer event the car would be fast for a bit but fade the back as the event wore on. The proper amount of differential will be learned from experience.

- Excessive difference between Left and Right side temperatures can show a car that will be fast for a short period and then fade as the right side tires get over used due to the left side tires not doing their share of the work.

- Excessive Front Averages generally indicate a pushing condition.

- Excessive Rear Averages generally indicate a loose condition.

- Tire temperatures should be taken as quickly as possible for the best readings and the probe needs to be inserted to the same depth each and every time. Reading should be taken as close to the cord as is reasonable.

- Used properly, temperature averages can be a fine tuning tool for a car that is already in the ball park and can be an indicator of future performance. Temperature Averaging can show a car that is starting to push or be loose before the driver senses the problem. Many times with new tires the car feels great to the driver because of the extra friction in the new rubber. The new tire can cover up a handling problem where the temperature averages would show the detrimental heat build up at a given end or cross. The closer you get to the optimum set up the more value you will get from the Temperature Averages. Temperature Averages used in conjunction with driver feedback, a good stopwatch, experience and crew chief voodoo is the best crystal ball you can find today.